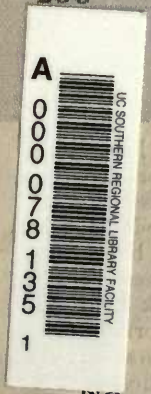
G.B. Brit. Natl health insurance joint committee. Medical research committee

For official use only



MEDICAL RESEARCH COMMITTEE

STATISTICAL REPORTS

No. 3.—AN ANALYSIS OF 8,670 OPHTHALMIC CASES TREATED AT A HOME HOSPITAL

January 22, 1919

In close relation to the work the Medical Research Committee have undertaken for the Army Council in the compilation of the formal Medical Statistics of the War, the Committee have provided accessory help in various directions for the collection and preservation of medical records and of the after-histories of military patients, with a view both to the present guidance of medical officers and to the future purposes of the Medical History of the War. This accessory statistical work has been effected by the arrangements made for the interchange of information between separate medical units overseas and between those overseas and at home, by the schedule system of collecting information in chosen series of cases, by clerical help supplied for tracing personal histories after discharge, and in other ways. Many communications giving statistical summaries of the results of treatment in various classes of medical and surgical patients have already been published by permission in medical journals, and others have been given in several of the reports issued or published by the Committee. With the sanction of the Director-General, A.M.S., the Committee have made arrangements to issue from time to time for official distribution statistical summaries which, whether from their provisional nature or for other reasons, are not proposed for publication elsewhere.

STATISTICAL REPORTS

No. 1. 656 Cases of Gunshot Wound of the Head. (*June* 13, 1918.)

No. 2. Gunshot Wound; Compound Fracture of Femur, and Penetration of Hip and Knee Joints. (*August* 8, 1918.)

No. 3. An Analysis of 8,670 Ophthalmic Cases treated at a Home Hospital. (*January* 22, 1919.)

Wt. P 1893. 217. 1000. 3/19. O.U.P.

AN ANALYSIS OF 8,670 OPHTHALMIC CASES TREATED AT A HOME HOSPITAL

BEING

A REPORT ON THE OPHTHALMIC WORK CARRIED OUT AT THE 2ND LONDON GENERAL HOSPITAL, ST. MARK'S COLLEGE, CHELSEA, FROM SEPTEMBER 1914 TO THE END OF 1917

BY

BREVET-MAJOR A. W. ORMOND, R.A.M.C.T.

SUMMARY.

I. *Number of Cases in each Category.*

Category.		*Total.*	PAGE
Out-Patients		5896	4
Men Blinded in the War		684	6
Enucleations of One Eye		436	7
Affections of the Cornea		276	8
Corneal Ulcer	205		
Corneal Opacities	35		
Interstitial Keratitis	36		
Cataracts		130	9
Affections of the Conjunctiva		200	10
Conjunctivitis	128		
Trachoma	39		
Blepharitis	33		
Affections Due to Indirect Injury		266	11
Concussion Injuries	117		
Concussion Blindness	39		
Contusion Injuries	110		
Affections Due to Direct Injury		163	13
Foreign Bodies in Globe and Orbit	116		
Perforating Wounds of Globe	31		
Injury to Orbit involving Acc. Sinuses	16		
Affections of the Uvea		177	15
Iritis	96		
Choroiditis	47		
Cyclitis	34		
Affections of Optic Nerve and Retina		62	16
Optic Nerve Atrophy	47		
Detachment of Retina	15		
Myopia, &c.		59	17
Myopia	54		
High degree of Astigmatism	5		
Vitreous Opacities, Intra-Ocular Haemorrhage		109	17
Nystagmus		15	18
Lachrymal Obstruction		14	18
Strabismus		13	18
Injuries to Nerves		9	18
Glaucoma		4	19

Category.		*Total.*	PAGE
Episcleritis		5	19
Neurasthenia		9	19
Affections Due to Various Causes		11	19
	Periostitis of Orbital Walls, Sinuses, &c. 3		
	Syphilis, 1 *Primary Chancre*, 1 *Tertiary* 2		
	Congenital Dislocation of Lenses 1		
	Exophthalmic Goitre 1		
	Burns 1		
	Injury to Occipital Lobe 2		
	Hemiplegia 1		
Plastic Operation		64	19
Unclassified (Papers not available)		68	

Out-Patients	5896
In-Patients	2774
Total	8670

II. *Average Time in Hospital for each Category.*

Category.	*Average Time in Hospital per Patient.*
Enucleations of one Eye	39 days.
Corneal Ulcer	36 ,,
Interstitial Keratitis	41 ,,
Corneal Opacities	30 ,,
Cataracts	43 ,,
Conjunctivitis	29 ,,
Trachoma	27 ,,
Blepharitis	25 ,,
Concussion Injuries	38 ,,
Concussion Blindness	31 ,,
Contusion Injury	31 ,,
Foreign Body in Eye and Orbit	40 ,,
Perforating Wound	32 ,,
Injury to Orbit	57 ,,
Iritis	33 ,,
Choroiditis	40 ,,
Cyclitis	45 ,,
Optic Atrophy	33 ,,
Detachment of Retina	36 ,,
Myopia	20 ,,
Vitreous Opacities, &c.	39 ,,
Nystagmus	18 ,,
Lachrymal Obstruction	33 ,,
Strabismus	25 ,,
Nerve Injury	37 ,,
Glaucoma, &c.	27 ,,
Plastic Operation	59 ,,

Taking the total number of in-patients, of whom we had definite notes—irrespective of their different categories—the average length of stay in hospital for each man was 35 days.

OUT-PATIENTS

The number of new cases seen in the Out-Patient Department between October 1914, when this department was first started, up to the end of 1917, was 5896. This does not include second and subsequent attendances.

The Out-Patient Department has been used extensively by M.Os. attached to camps, hospitals, labour centres, recruiting boards, and travelling medical boards in and around London. Men have attended from Epping Forest, Hertford, Mile End, Bethnal Green, Tooting, Mitcham, Springfield, Hampstead, Fulham, Dollis Hill, Richmond; from the large camps at Wimbledon and the White City; from the various labour centres in London, and from the Guards depôts at Purfleet, Windsor, and Reading.

Many other centres also, too numerous to mention, have asked and received opinions on ophthalmic conditions occurring in soldiers under their command.

Owing to the fact that as early as 1914 the 2nd London General Hospital was constituted an ophthalmic centre where the men blinded in the war were to be sent, the hospital at Chelsea was referred to by large numbers of units, command depôts, hospitals, &c., for specialists' opinions on ophthalmic matters.

The numbers for each year have shown a very marked increase on the preceding year, and the numbers in 1918 are likely to be nearly equal to the preceding two years taken together.

The work of the department consists largely of testing the eyesight of men and recording their vision, working out their errors of refraction, ordering glasses if advisable, writing out reports for the M.Os. sending the cases, fitting artificial glass eyes, treating small surgical or medical ailments, making ophthalmoscopic examinations, and, in 1917, discouraging malingerers.

In addition the 2nd London General Hospital is a spectacle centre for the distribution of glasses ordered elsewhere, but no account of such work appears in this report.

Number of New Cases seen at O.Ps. from October 7, 1914, *to December* 31, 1917.

Hypermetropia and Hypermetropic Astigmatism	1356
Myopia and Myopic Astigmatism	1814
Mixed Astigmatism	287
Presbyopia	115
Amblyopia in one eye	274
Strabismus	133
Enucleation	99
Nystagmus	31
Vitreous Opacities	41
Retinal Affections	56
Cataracts	122
Conjunctivitis, Lids and Lachrymal Affections	241
Foreign Bodies on Cornea, Injuries, &c.	101
Corneal Ulcers, Opacities, &c.	229
Cyclitis	5
Iritis	43
Optic Nerve Affections	27
Choroidal Affections	76
Gas Cases	18
Inspections, Opinions, Records of Visions, &c., where no treatment or spectacles were considered advisable from a military standpoint	828
	5896

IN-PATIENTS

Men Blinded in the War.

Of the men who have been blinded during the war I have notes of 684, seen during the years 1914–17 inclusive.

Generally speaking, they may roughly be divided into two main classes:

(1) Those who lost their sight owing to a transversely-passing missile, a bullet or piece of shrapnel, which entering on one side of the head passed horizontally or obliquely across and came in contact, directly or indirectly, with one or both orbits, passing out on the opposite side. The majority of these wounds were probably due to bullets, which in most cases passed clean across and did not remain in the tissues; sometimes the bullet was subsequently removed, but not in the greater number of cases. Pieces of shrapnel, on the other hand, frequently remained in the tissues, owing, no doubt, to the fact that their irregular shape rendered them less able to overcome the resistance incurred.

(2) Cases in which, owing to the bursting of a shell, bomb, &c., in front of the face, the eyes themselves were either destroyed directly, or, pieces of metal penetrating them, they subsequently shrivelled up as the result of a chronic septic irido-cyclitis, engendered by the presence within the globe of innumerable minute metallic foreign bodies.

The proportion of bullet wounds, i.e. 'through and through' wounds, to those due to shell bursts is about 2 : 3, and the proportion has diminished during the last year—that is to say, there are fewer simple straightforward bullet wounds and more wounds due to bursting shells, &c. The reason for this is probably that given to me by Col. —— at the end of 1917, when I pointed out to him that we were receiving very few cases due to sniper's bullets compared with 1915 and 1916, 'Ah, we have learnt how to deal with snipers now.'

During the first three years of the war 659 men were transferred from the 2nd London General Hospital to St. Dunstan's Hostel. All these cases were wounded or lost their vision in 1914–17, and were for all practical purposes blind.

Of these, 340 were actually and really blind—that is to say, they had no sight at all; 175 of these had no eyes, both having been either destroyed by the injury or removed subsequently on account of panophthalmitis, pain, &c.; the remainder had either shrunken globes, severed optic nerves, or such extensive disorganization of the retina and choroid, &c., as to destroy sight entirely.

The majority of these St. Dunstan's cases were due either to 'through and through' bullet wounds, sometimes called 'entrance and exit' wounds, or to shell splinters driven against them by explosion.

The recorded numbers are:

'Through and Through' cases . .	140
Shrapnel and explosion injuries, &c. .	248

In some cases the notes do not specifically state which was the cause.

A small number of blind cases, about 17, are the results of disease, such as optic atrophy, Leber's atrophy, detached retina, &c.

Amongst the men retaining some sight were one-eyed men with ruptures of the choroid, organized masses of blood in the vitreous, traumatic cataracts and traumatic irido-cyclitis with shrunken globes. Of these the happiest experience was of course that of the men who had traumatic cataracts, who by subsequent needling and evacuation of the lens material, got reading vision with proper glasses. If (and there have been about a dozen such cases) vision after the removal of the lens gave them 6/18 or better with correction, they were not kept at St. Dunstan's.

In some cases the fields of vision were good, damage having occurred to the macula only, and many men could 'see to get about', but not having reading vision they were retained at St. Dunstan's for educational purposes.

Deliberate malingering was very rare indeed; a few men took exaggerated views of their disabilities, and, owing to the increased pension for total loss of sight and the attractions of St. Dunstan's, were unduly influenced perhaps to acclaim themselves 'blind', more so than would have been the case had there been no such amenities; they, however, were not as a rule very persistent.

It is impossible to record in this brief resumé of the Hospital work all the many interesting and instructive cases among these men, but those which illustrate some special point of interest will be related in a subsequent paper.

The cause of the loss of vision among all the 684 men under consideration here was either: concussion injury, resulting in rupture of choroid and retina, intra-ocular haemorrhage, atrophy of ciliary body and shrinking, optic atrophy, sclerosing keratitis, traumatic cataracts, detachment of retina, or injury to occipital lobe; and sometimes two or more of these causes were operating.

Enucleations.

Total number of cases of Enucleation		436
Number enucleated in England	76	
Number enucleated abroad	345	
Number no note where enucleated . . .	15	
Number returned to duty	293	
Number sent to Auxiliary Hospitals . . .	91	
Number discharged as permanently unfit . .	18	
Number of whose discharge there was no note .	32	
Number died (Meningitis, 1; Peritonitis, 1) .	2	

In this group are placed cases in which one eye was removed, the other retaining good vision.

The reasons for the enucleations are in their order of numerical importance:

1. Gross injury at the time of the wound.
2. The presence of foreign particles in the eye.
3. Feared sympathetic inflammation.
4. Persistent pain.
5. Panophthalmitis.

Amongst the number are two cases in which the eye was removed on account of sarcoma of the ciliary body, two for staphylomata following corneal ulcer, and two for secondary glaucoma.

Only one case developed sympathetic ophthalmia, and he regained 6/9 vision in the sympathizing eye.

The insertion of a glass ball in Tenon's capsule is recorded in twelve cases, and these were all successful in giving the patient an excellent stump for the carrying of an artificial glass eye.

AFFECTIONS OF THE CORNEA.

Total number of cases		276
Corneal Ulcer	205	
Corneal Opacities	35	
Interstitial Keratitis	36	
Total number of cases of Corneal Ulcer		205
Number due to Traumatism	85	
Number due to Non-traumatic Causes	100	
Number due to Malaria	8	
Number due to Dendritic Ulcers	11	
Number due to Gas	1	
Number returned to duty	127	
Number sent to Auxiliary Hospitals	61	
Number discharged as permanently unfit	7	
Number of whose discharge there was no note	10	

Causes why men were boarded as permanently unfit were, either that they were 'one-eyed' men or both eyes were affected.

Corneal Ulcer.

There are 205 cases of corneal ulcer. Of these 85 were due to traumatism in some form, the majority the result of bomb explosions by which small fragments of metal, stone, mud, or grit were hurled against the eyes.

They were all of a superficial variety and resolved under the treatment ordinarily employed for corneal ulcers of a septic traumatic nature; some required actual cauterization either with the electric cautery or with pure carbolic.

This group does not include any in which perforation had taken place; those will be found among foreign bodies in the globe.

One hundred were non-traumatic. These include a large number of simple ulcers due to septic absorption, septic teeth being sometimes a cause.

Most were associated with similar conditions experienced during civilian life, which recurred during the stress of military life, and were no doubt the results of hardships and exposure on physiques which were not sufficiently robust to stand the strain.

The dendritic ulcers were an interesting group, and their association with malaria was definitely substantiated in some cases, but men coming from Salonika, Mesopotamia, and the East, and giving a history of malarial infection, were found to have ulcers which clinically showed no signs of being herpetic in form, and in some cases typical dendritic ulcers were found in men who had no history of malaria and had never been in the East.

The result of the treatment of these cases of corneal ulcer is very satisfactory from a military point of view. Only a very few were

permanently discharged the Service, the vast majority being returned to duty, or to convalescent homes for continued treatment, and subsequently to duty.

Those discharged permanently were cases in which either both eyes were involved or where one eye had been removed previously.

Corneal Opacities.

Total number of cases of Corneal Opacity		35
Number returned to duty	28	
Number sent to Auxiliary Hospitals	2	
Number discharged as permanently unfit	5	
Traumatic	15	
Non-traumatic	20	

These cases when admitted had healed corneal opacities. The traumatic ones were mainly the result of old accidents in childhood or early youth. A few had occurred as the result of war injuries, healed traumatic corneal ulcers, but the majority were non-traumatic, and the result of superficial keratitis due to ordinary septic causes such as are commonly found in any civilian out-patient department.

Interstitial Keratitis.

The majority of these were straightforward cases of congenital syphilis in men giving a definite positive Wassermann reaction.

The only point remarkable is that many were older than is usual, as interstitial keratitis is commoner before 20 and a large proportion of these men were over 20, and the onset of the keratitis was determined often by definite wounds to the eyes themselves.

Two cases were associated with malaria, one giving a positive Wassermann and one a negative; and two were associated with mustard gas, one giving a positive and one a negative Wassermann.

There were 36 cases of which:

Number returned to duty	13
Number sent to Auxiliary Hospitals	11
Number discharged as permanently unfit	11
Number of whose discharge there was no note	1

Cataracts.

Total number of cases of Cataract		130
Number due to Traumatism	118	
Number Non-traumatic in origin	12	
Number of Concussion Cataracts	19	
Number of cases operated on	41	
Number of cases where final result of vision was recorded	20	
Of these 14 obtained vision of 6/24 or better.		
Number of cases not operated on	89	
Of these 12 were Non-traumatic and 19 were Concussion (partial) Cataracts.		
Number returned to duty	53	
Number sent to Auxiliary Hospitals	35	
Number discharged as permanently unfit	25	
Number of whose discharge there was no note	17	

This category includes 130 cases of cataract affecting one or both eyes in men who still retain sufficient vision in either eye to prevent their being classified as blind men.

Of these 130 all are of traumatic origin except twelve, six of the twelve being lamellar cataracts of the type usually found in children and young adults, and six of a senile progressive kind seen in the early stages.

Of the traumatic kind 19 were concussion cataracts due to contusions of the eye and mostly displaying the star-shaped opacity, located at the posterior pole.

58 cases of traumatic cataract remained un-operated on as, for one reason or another, surgical interference seemed inadvisable.

41 were dealt with surgically, and of these, 20 have the final results recorded. In 21 cases, owing to their being sent to convalescent homes and being boarded from those centres, it has not been possible to obtain the final results, the patients having left the 2nd London General Hospital after being needled, but before the pupil was finally cleared of all opacity.

Of the 20 cases in which operative interference has been employed and the results recorded:

14 have obtained good vision, i.e. 6/24 or better with glasses;
6 have obtained less than 6/60.

Affections of the Conjunctiva.

Total number of cases		200
Conjunctivitis (simple)	78	
Conjunctivitis due to Gas	46	
Trachoma	39	
Blepharitis	33	
Pterygium	4	
Simple Conjunctivitis		78
Infective	49	
Traumatic	22	
Accidental	7	
Gas Conjunctivitis		46
Without Corneal complication	40	
With Corneal complication	6	
Number of cases of Conjunctivitis including Pterygium (4)		128
Number returned to duty	79	
Number sent to Auxiliary Hospitals	40	
Number discharged as permanently unfit	3	
Number of whose discharge there was no note	6	
Number of cases of Trachoma		39
Number returned to duty	20	
Number sent to Auxiliary Hospitals	5	
Number discharged as permanently unfit	13	
Number of whose discharge there was no note	1	
Number of cases of Blepharitis		33
Number returned to duty	24	
Number sent to Auxiliary Hospitals	5	
Number discharged as permanently unfit	3	
Number of whose discharge there was no note	1	

Blepharitis associated with errors of refraction or corneal opacities is responsible for a certain number of unfit men. Most of these were

improved, but none permanently cured. The history was almost invariably a long one, and the condition was not obviously aggravated by military service. Probably the reverse was the case.

Conjunctivitis, &c.

The interest of this group lies in those cases of conjunctivitis due to gas. We received some very severe cases in which not only the eyes, but the skin of the abdomen, scrotum, penis, and buttocks was also very severely burnt.

Two cases had such severe injuries of the cornea that complete opacity of each resulted, and these two men were subsequently transferred to St. Dunstan's.

One instance of keratitis—the result of gas—was slight, and six of conjunctivitis, in which the cornea was also involved, were severe.

Where destruction of the cornea resulted the cause was probably that the actual liquid had reached the corneal membrane, as these cases were the result of gas shells bursting close to the face.

In the early stages soothing treatment was employed such as hot fomentations, irrigations with normal saline and carbonate of soda lotions, boracic ointment, liquid paraffin, &c. After about a fortnight, however, more astringent treatment by sulphate of zinc, protargol, exposure to fresh air and light, was insisted on, and any case that remained in hospital more than a month was specially considered and reported on.

No cases were re-admitted during this period, and special efforts were made to prevent these lapsing into cases of chronic photophobia with functional blindness, although we received two or three cases sent to us under the impression that they were fit cases to be transferred to St. Dunstan's.

Injuries to the Globe the Result of Contusion and Concussion.

Total number of cases		266
Wounds the result of Contusion	110	
Wounds the result of Concussion	117	
Concussion Blindness	39	
Contusion Wounds		110
Number returned to duty	52	
Number sent to Auxiliary Hospitals	22	
Number discharged as permanently unfit	3	
Number of whose discharge there was no note	32	
Number died	1	
Concussion Wounds		117
Number returned to duty	73	
Number sent to Auxiliary Hospitals	30	
Number discharged as permanently unfit	7	
Number of whose discharge there was no note	7	
Concussion Blindness		39
Number returned to duty	18	
Number sent to Auxiliary Hospitals	9	
Number discharged as permanently unfit	4	
Number of whose discharge there was no note	8	

Contusion Injuries.

The differentiation between wounds due to contusion and those due to concussion is difficult to maintain, and probably many cases ought to be transferred from one category to the other.

By concussion is implied a 'shaking', and by contusion a 'bruising'. But obviously a bruising is capable of starting vibrations in the deep part of the globe and so becoming capable of producing a concussion injury.

Contusion, however, implies a direct contact, whereas concussion injuries may be due to vibrations conveyed from a distance.

Concussion Injuries.

Under this heading are grouped injuries done to the globe by indirect violence, causing rupture of the choroid, retina, iris, and lens capsule, and resulting in intra-ocular haemorrhage, irido-dialysis, irregular pupil, and cataracts.

Intra-ocular haemorrhage in some instances where it was slight failed to obscure the view of the fundus and disappeared rapidly by absorption. In others it appeared, on the contrary, to increase so that details of the fundus, which had been seen and recorded, became after a time entirely obliterated and the red reflex lost.

This may be due to one of two conditions:

(1) Either fresh haemorrhage occurs some days or weeks after the injury, even when the patient has been kept in bed and at rest, or—

(2) A mass of haemorrhage encapsuled and confined as it were to one part of the vitreous chamber, subsequently, owing possibly to a rupture of the membrane confining it, and a liquefying of the vitreous, becomes dispersed over the whole posterior chamber, thus obliterating the red reflex entirely. In some cases it was absorbed later on, and in others, owing to its size and density, became discoloured, organized, and changed into soft snow-white masses, which later again shrank and drew away the retina, subsequently leading to detachment and a shrunken soft eye.

The most satisfactory way of dealing with these masses of blood has proved to be by mechanical means, i.e. massage, and the time taken for the absorption of the blood varied from one to six months.

Another point of interest is the time which elapses after the injury, before the lens turns opaque. It may be only a few days, but I have had some cases in which the lens has remained clear for six months and then become opaque.

Ruptures confined to the retina and appearing ophthalmoscopically as 'holes' at the macula are of course rare compared to the far commoner cases of rupture of the choroid, involving the retina as well, but commoner still are the ruptures of the choroid in which the retinal vessels can be seen to pass over the rupture undisturbed.

Concussion Blindness.

One of the principal ocular features of the War has been the number of cases of functional blindness due to the violent explosions caused by high explosive shells, bombs, hand-grenades, &c. These cases may or may not have sustained definite organic injuries, but the

clinical symptoms characterizing their functional nature are very clearly marked.

Usually the patient has been rendered unconscious by an explosion in his close vicinity, and on regaining consciousness he finds that he is unable to see. When examined he presents the following symptoms: the eyes are kept closed, the lids may be frequently 'fluttered', or, as one man stated, 'he could not keep his eyes from twinkling'. On attempting to open the lids the patient resists forcibly by means of his orbicularis; when this is overcome to a sufficient extent to see the globes, they are found to be rolled forcibly upwards, and the pupils are always kept covered by the lids; he has great difficulty in looking downwards, and complains of pain and photophobia, and shows marked fatigue as a result of the examination. In some cases I have noticed an acceleration of the pulse-rate and also perspiration. The photophobia is not, however, really influenced by light, as the condition does not diminish in very subdued illumination; these patients never move about as blind men would, they invariably avoid hurting themselves; but all the same they never relax, even if watched for weeks at a time, the groping action of people with extremely defective sight, and judged by every test they maintain this condition indefinitely, and are undoubtedly psychically blind; the pupils react normally, and the fundus shows no definite change. There is no difficulty in differentiating them from malingerers, as they pass through long periods of real mental distress and serious discomfort. These cases vary enormously in severity; some recover rapidly, others seem to go on indefinitely if not treated, or treated unsuccessfully. Any lack of recognition of the condition in the early stages enormously prejudices the prognosis.

Affections due to Direct Injury.

Total number of cases		163
Foreign Body in Eye and Orbit	116	
Perforating Wound of Eye	31	
Injury to Orbit involving Accessory Sinuses	16	
Number of cases of Foreign Body		116
Number returned to duty	84	
Number sent to Auxiliary Hospitals	25	
Number discharged as permanently unfit	1	
Number of whose discharge there was no note	6	
Number of cases of Perforating Wound of the Eye		31
Number returned to duty	22	
Number sent to Auxiliary Hospitals	7	
Number discharged as permanently unfit	1	
Number of whose discharge there was no note	1	
Number of cases of Injury to Orbit		16
Number returned to duty	7	
Number sent to Auxiliary Hospitals	6	
Number of whose discharge there was no note	3	

Foreign Body in Eye and Orbit.

In this group of cases are instances where various foreign bodies, mainly of metallic origin, struck the globe and inflicted damage. The nature of the missile varied: splinters of shrapnel, lead, brass, iron

(magnetic and non-magnetic), stones from the road, sand, wood, and bone.

Generally speaking, the small fragments which were stopped by the resistance of the cornea or sclera resulted in comparatively small permanent damage to vision, and most of the cases regained good vision (6/12 and 6/6) after a long period of acute conjunctivitis and keratitis with photophobia.

Where fragments were brought to rest in the anterior part of the eye in the anterior chamber or iris, good results were obtained, the vision ultimately averaging 6/36, 6/18.

Those, however, in which particles of metal of even small size penetrated deeply into the vitreous, retina, and choroid were usually responsible for severe damage, poor vision, and often entire loss of the eye.

Metallic fragments damaging the eye by striking the globe, without actually penetrating the tunic and which came to rest in the orbital tissue gave varying results, according to the size of the fragments and the tissues involved.

Where the optic nerve was actually torn across, complete blindness resulted, but often severe intra-ocular haemorrhage, with solid detachment of the retina or traumatic cataract would result from these non-perforating wounds.

Some pieces of metal undoubtedly traversed the globe, entering on one side and passing out again, and in these cases also severe damage to vision resulted.

A large number of eyes which were found to be tolerant of the presence of metallic or other foreign bodies were left alone, if the extraction of the particles by the magnet was found to be impracticable (the fragment not reacting to magnetic force), or if the fragment was in such a position and of such a size that the removal would probably mean a loss of vision which would render the eye useless.

The results of the extraction of foreign bodies by the electro-magnet when they have penetrated deeply into the globe are disappointing, but we must remember always that the mere passage of the metal, the violence of the impact and the consequent haemorrhage preclude the possibility of a good result apart from the necessary damage due to the extraction, however skilfully done. Also it must be remembered that the cases sent to us from France would only be, in all probability, those that had received severe damage, the slighter cases being treated in the Base Hospitals at Boulogne, Rouen, &c.

Perforating Wounds of the Eye.

Included under this heading are 31 cases, one eye only being involved; the majority had prolapse of the iris, and after iridectomy 17 obtained vision of 6/24 or more, while more than half had vision equal to or better than 6/60; the greater number were due to pieces of metal striking the eye with considerable violence.

These cases do not include those which had Traumatic Cataract. From the point of view of surgical interference they form a satisfactory group, as none of them were lost by septic inflammation and the majority retained useful vision, in spite of the severity of the original injury.

Injury to the Orbit involving the Accessory Sinuses.

This group is really a large one, but most of the cases are included in the 'blind' category, as the 'Through and Through' wounds perforating the orbits and nasal or other accessory sinuses often caused so much damage that the patient was rendered quite blind.

These 16 cases, however, received damage mainly to one side. The symptoms of involvement of the accessory sinuses are: bleeding from the nose, discharge of pus or mucopus from anterior nares or into the throat, anosmia, acute sinusitis with abscess formation and later persistent sinus formation, blocking of the nasal airways, supra-orbital pain, and pain about the orbits generally, with oedema of the lids.

It is, however, remarkable what extreme mischief can be done to the bones of the face and the sinuses, and the patient make no complaint at all: most of the symptoms develop late and the involvement of the ethmoidal and maxillary sinuses often produce symptoms months after the occurrence of the wound.

AFFECTIONS OF THE UVEA.

Total number of cases		177
Iritis	96	
Choroiditis	47	
Cyclitis	34	
Number of cases of Iritis		96
Number returned to duty	51	
Number sent to Auxiliary Hospitals	28	
Number discharged as permanently unfit	6	
Number of whose discharge there was no note	11	
Number of cases of Choroiditis		47
Number returned to duty	16	
Number sent to Auxiliary Hospitals	5	
Number discharged as permanently unfit	21	
Number of whose discharge there was no note	5	
Number of cases of Cyclitis		34
Number returned to duty	21	
Number sent to Auxiliary Hospitals	9	
Number of whose discharge there was no note	4	

Iritis.

As causes of iritis these cases represent: syphilis, acquired (12) and congenital (8); gonorrhoea (13); sepsis, mainly from the condition of the teeth and mouth generally (9); traumatism, the result of small, often minute, septic particles of dust, stone, or metal being driven into the cornea, and in some cases into the anterior chamber (12); and malaria, in which the blood was at the time of examination teeming with the benign quartan parasites, and the Wassermann reaction was negative (1); tubercle (1).

There is no doubt that cold and damp precipitate an attack of inflammation in those who have some latent septic focus present about them, and that an uncured prostatitis or urethritis is often the primary cause of recurrent attacks, which are claimed as being due to the cold and damp of the trenches. This was more specially remarked in the winter of 1915–16, and amongst the junior subalterns.

As is so often found, a certain number (40) of these cases seemed to occur spontaneously, and no septic or infected association could be found to couple with the inflammation of the iris.

Choroiditis.

Twenty of these cases are due to acquired or inherited syphilis. Others are associated with myopia of a high degree, traumatism, or oral sepsis, and in others no certain etiological factor could be ascertained.

Cyclitis.

The causes in this group are mainly three: traumatic, septic from teeth, syphilitic. The same three causes were responsible for most of the cases of iritis. A few, however, had more unusual etiological factors, such as malaria, dysentery, and trench fever.

It would be expected that metastatic cyclitis and iritis would occur in connexion with extensive wounds with suppuration, but this has only occurred in a very few cases, and these few are not of absolute certainty.

AFFECTIONS OF THE OPTIC NERVE AND RETINA.

Total number of cases		62
Optic Nerve, Atrophy and Neuritis . . .	47	
Detachment of Retina	15	
Number of cases of Optic Nerve, &c.		47
Number returned to duty	17	
Number sent to Auxiliary Hospitals . . .	4	
Number discharged as permanently unfit . .	12	
Number of whose discharge there was no note .	14	
Number of cases of Detachment of Retina . . .		15
Number returned to duty	11	
Number sent to Auxiliary Hospitals . . .	3	
Number of whose discharge there was no note .	1	

Optic Atrophy.

Optic atrophy forms a large and varied class, and the cases found in our records illustrate very well the many different etiological factors that produce this condition.

It should be pointed out that the cases of optic atrophy due to *direct injury* are not included in this list, only those traumatic ones the result of *indirect damage* from blows on the nose, orbital margins, and bones of the face, where the nerve condition was the most marked result of the blow. Also, as optic atrophy generally involves both eyes, many cases of Atrophy will be found among the blind men sent to St. Dunstan's, and are entered under that heading.

Syphilis, both inherited and acquired, claims over a third of the total number.

Of the cases of atrophy consequent on severe haemorrhage, I have only seen one case, and that was not very convincing; this fact supports the contention that where optic atrophy has resulted from severe loss of blood the patient has some general constitutional factor which has caused a general debility, and that severe haemorrhage as a result of warfare, in perfect healthy men, does not seem to produce optic atrophy.

Malaria and quinine both figure as causes of optic atrophy, and the usual attenuation of the central retinal vessels was seen in most cases due to quinine.

The familiar type of atrophy occurring in young men and characterized by a central scotoma, often designated Leber's type,

gave four instances, and lastly there are also included cases similar to those with which we were familiar before the War in our civilian out-patient work, of optic atrophy associated with no other symptoms discoverable at the time of examination. However, one patient of this class died 18 months later of G.P.I.

Detachment of the Retina.

These were either fluid, due to the presence of subretinal exudation, or solid, due to blood which in many cases had organized.

Trauma was not infrequent in the history, and myopia was the cause of two.

MYOPIA, &c.

Total number of cases		59
Myopia	54	
High degree of Astigmatism	5	
Number of cases of Myopia		54
Number returned to duty	37	
Number sent to Auxiliary Hospitals	2	
Number discharged as permanently unfit	12	
Number of whose discharge there was no note	3	
Number of cases of high degree of Astigmatism		5
Number returned to duty	3	
Number sent to Auxiliary Hospitals	2	

Myopia.

High myopes and men with high degree of ametropia associated with defective visual acuity are included in this group.

The myopes frequently had patches of choroidal atrophy, and a large proportion were either discharged the Service or put into very low categories.

These men were all received into the wards of the Hospital, and are not included in those attending the Out-patient Department; they were found to be unable to carry on their duties in France and elsewhere, and were returned for re-categorization or permanent discharge.

INTRA-OCULAR HAEMORRHAGE, VITREOUS OPACITIES.

Total number of cases		109
Number returned to duty	66	
Number sent to Auxiliary Hospitals	36	
Number discharged as permanently unfit	1	
Number of whose discharge there was no note	6	

Of these 109 cases—

81 were due to injury from explosion, shrapnel fragments being violently driven against the eye, in some cases penetrating it.

17 were due to bullets passing close to the globe and rupturing the membrane by concussion vibrations.

4 were spontaneous, no cause being ascertained.

4 were due to accidents (barbed wire, wood, &c.).

3 were not recorded in sufficient detail to say if shell splinter or bullet was the cause.

26 had vision equal to or better than 6/60.

19 had a foreign body in the eye, or had had one removed.

This category comprises those patients in whom haemorrhage within the eye was the main clinical feature when the case arrived in Hospital. The time taken for the blood to absorb varied from one to six months, according to the amount present and the degree of damage

done to the tissues. The result in most cases was that after the vitreous cleared, ruptures of the choroid and retina were found.

Some of the blood became organized and formed masses of snow-white tissue, often with bands stretching across the fundus in various directions, and sometimes resulting in detachment of the retina owing to shrinkage.

Nystagmus.

Total number of cases		15
Number returned to duty	7	
Number sent to Auxiliary Hospitals	1	
Number discharged as permanently unfit	6	
Number of whose discharge there was no note	1	

Of nystagmus there were 15 cases, all either congenital or due to defects of vision acquired during early infancy; these men had all been employed in France, but failed to continue to be able to fulfil their military duties; they were either discharged the Service as permanently unfit or kept for Home Service, and many could claim an aggravation of their symptoms owing to Military Service.

A large number of men—similar in condition—were seen as out-patients and were dealt with before being sent abroad.

It is doubtful if men with nystagmus (if well marked and associated with considerable ametropia and defect of visual acuity) ought to be employed at all for active Military Service.

Lachrymal Obstruction.

Total number of cases		14
Number returned to duty	8	
Number sent to Auxiliary Hospitals	5	
Number of whose discharge there was no note	1	

A large number of cases in which the lachrymal canaliculi and ducts were damaged are to be found in other categories: for instance, among 'Men Blinded in the War' and 'Injury to the Orbit involving the Accessory Sinuses', but a certain number were isolated cases and these were usually treated by antiseptic drops, &c., for a time, and then if the condition still remained unsatisfactory the sacs were excised.

Strabismus.

Total number of cases		13
Number returned to duty	12	
Number of whose discharge there was no note	1	

All these cases except two were convergent concomitant squint. Two only were divergent. They were associated with astigmatism or amblyopia in one eye, and were usually sent by the military authorities for treatment.

Nerve Injuries.

Total number of cases		9
Number returned to duty	4	
Number sent to Auxiliary Hospitals	4	
Number of whose discharge there was no note	1	

The number of cases is large in which the muscles or nerves supplying the muscles are damaged; all the cranial nerves from the

first to the eighth inclusive have been involved in patients who have been included in various categories. A few cases, however, have occurred in which the most marked result has been due to the damage done to the nerves and the diplopia consequent on this the main symptom troubling the patient.

Three cases of congenital Ptosis were operated on, one associated with jaw movements.

Glaucoma, Episcleritis, Neurasthenia, Affections due to Various Causes.

Total number of cases		29
Number returned to duty	14	
Number sent to Auxiliary Hospitals	4	
Number discharged as permanently unfit	5	
Number of whose discharge there was no note	6	
Glaucoma	4	
Episcleritis	5	
Periostitis around Orbit	3	
Syphilis	2	
Congenital Dislocation of Lens	1	
Exophthalmic Goitre	1	
Neurasthenia	9	
Burns	1	
Injury to Occipital Lobe	2	
Hemiplegia	1	

Plastic Operation.

Total number of cases		64
Number returned to duty	37	
Number sent to Auxiliary Hospitals	21	
Number discharged as permanently unfit	2	
Number of whose discharge there was no note	4	

A large number of cases of deformities in which Plastic Operations were performed are included in other categories: for instance, St. Dunstan's men, &c.

These cases placed together here have not been included elsewhere, and were admitted for the purpose of having scars removed or deformities remedied by Plastic surgery. They are, for the most part, intermediate in point of time, and by that I mean they were operated on, or were sent for operation, when the wounds had only just healed and were thus intermediate between the cases operated on within the first week and the late cases, which are dealt with twelve or eighteen months after being wounded.

It is impossible to deal with them individually in a mere statistical report such as this, but it may be said that most were improved by means of flaps with pedicles attached, and no great number were dealt with by grafts removed from distant parts of the body.

In most cases suppuration had taken place in the area operated on, and the early disturbance of healed tissues necessitated by the operation resulted in most of the cases healing by marginal granulations, with some septic discharge.

The number of failures were few, the pediculi being sufficient to sustain the vitality of the graft, and the high degree of health and fitness of the patients ensured a good blood-supply and a vigorous reaction and resistance to the invading organism.

In fact a justifiable criticism might be passed on the earlier efforts, viz. that the grafts were too small, and not enough boldness was displayed in removing large enough pieces of tissue for transference, with the result that months later the shrinking which took place caused some disappointment, as in the case of contracted sockets.

Sometimes a second operation was necessary owing to the contraction being so great that too small a glass eye was all the space would allow.

Ectropion, contracted sockets, torn lids, destroyed lids, damage to bridge of nose, the removal of adherent scars and the closing over of the holes leading into the nasal cavities and sinuses (the result of bullet wounds), were among the commoner cases sent for operative interference.

Accidents.

In going through the medical case-sheets of these 2574 cases the number of injuries due to *accidents* other than those directly attributable to enemy action seemed to be large, and it was thought to be of interest to tabulate these cases and record them.

The number of preventable accidents numbered 160. The premature bursting of bombs, cartridges, &c., thrown into the fire, accidents from 'horse-play', wood-chopping, generally by incorrect tools (such as chopping wood with a pick-axe), kicks from a horse, the inspection and manipulation of metallic objects picked up casually on the battle-field, &c., caused the majority of these. One of the most tragic and at the same time most stupid accidents was the result of lighting a fire on the top of a box filled with unused hand grenades. Many of these accidents happened at home in the bombing schools and schools of instruction, but more were received from abroad. The percentage is higher than one would have expected.

In summarizing this statistical report it must be pointed out that no mention has been made of a very important fact regarding the work of the department, viz. that cases having very slight ophthalmic interest, but very serious general surgical wounds, were habitually treated and nursed by the staff, owing to the army regulations that all ophthalmic cases were to be drafted to the ophthalmic wards; it therefore sometimes happened that, for instance, a man who had had an eye removed in France was placed in the ophthalmic wards even though he had a bad compound fracture of the thigh or arm, wounds of the chest or shoulder, and, had this not been so, the average time spent by each patient in the wards would undoubtedly have been considerably lower.

It cannot be maintained that the record is entirely complete, as no arrangements were made to facilitate the recording and categorizing of the medical records from an ophthalmic point of view, and also many cases were transferred to the Colonial authorities, together with their medical case-sheets, before copies had been secured, although this only occurred as a rule when the rush of work was considerable: such cases as may have been missed, however, would not be of sufficient number to materially alter the record as typical of the material passing through a large military ophthalmic department.